

PARKVILLE WATER DISTRICT WELL REHAB

Parkville Water District well rehab project turned out amazing results. The bacteria, scale and microorganisms have been removed to extend well life. The food source has been removed to extend the time before bacteria and microorganisms can form. The screen has been cleared of blockage allowing the well to pull in more water and improve the well efficiency. New pump is installed and meeting flow and head requirements. The new pump has greatly improved efficiency capabilities resulting in reduced energy Consumption.

Central Pump Company
Center, CO

September, 2015



Problem:

Pump # 2 was not producing the pressure necessary to move water so the pump was not producing any water.

Evaluation:

Central Pump Company was hired to evaluate the well. The following is a quick overall process of how the system was evaluated.

- 1.) The pump was pulled and evaluated for damage.
- 2.) The well was test pumped to evaluate the performance of the well.
- 3.) The well was videoed to look for physical damage to the casing and determine the condition of the screen.

Evaluation Results:

- 1.) A significant portion of the pump bolts were deteriorated and broken allowing the bowls to separate slightly and not hold pressure.
- 2.) The well test revealed a low specific capacity producing only 4.5 gallons per foot.
- 3.) The video of the well revealed serious blockage of the screen.

Pump Test:

Time:	Test 1	Test 2	Test 3	Test 4
Pumping water level	43	39	35	31
Static water level	6	6	6	6
Draw down	37	33	29	25
Orifice reading	24.5	18.5	17	11.5
Gallons per min	164	146	136	111
Specific Capacity	4.43	4.42	4.69	4.44
Pressure:	0	15	34	45
total head:	43	74	114	135
Volts [ave]	480	480	480	480
Amps [ave]	22.67	22.67	22.67	22.67
Kw input	15.1	15.1	15.1	15.1
Meter r/s				
Water hp:	1.8	2.7	3.9	3.8
Input kw:				
Input hp:	20.2	20.2	20.2	20.2
Break horse power	16.2	16.2	16.2	16.2
Pump efficiency	11%	17%	24%	23%
Wire-water efficiency	9%	13%	19%	19%

Well Screen Video Images Prior to Cleaning:



Pump Bowl Images after Removal:



Solution:

- 1.) Replaced Pump with a 14 stage 8LC American Marsh A trim impellers. The condition of the bolts were so bad separation the bowls would prove to be cost prohibitive and result in damage to the bowls and ultimately the bowls would need to be replaced
- 2.) Rehab the well. The combination of the test pump and video of the well provided us with the information to rehab the well.

The well rehabilitation chemicals, processes and procedures were as prescribed in accordance with the Well-Klean® Program by HercChemTech, LLC.

Well-Klean® Program Overview:

Hydrogen Peroxide (Biocide) – Used to penetrate and break down biomatter, bio-film, tuberculation and nodules.

Well-Klean® Concentrate (Catalyst/Inhibitor) – Used with biocide to increase the chemical functionality while minimizing corrosion.

Well-Klean® Pre-blend (Cleaner/Descaler) – Catalyzed and inhibited muriatic acid with dispersion, sequestration and chelation agents.

Sodium Bicarbonate (soda water) – Used to neutralize the free acid and chlorides, to passivate the environment and native metals, suppressing the environment conducive to the support of bacteria.

Sodium Hypochlorite Chlorine – Disinfectant.

Results:

The new pump now has the ability to meet the demand of the system. The pump is designed to pump 150 gpm at 434 ft of head.

The well rehabilitation improved the performance of the well dramatically. The chemicals and processes cleaned the screen of the scale and bacteria, opening the screen to allow more water into the well. Specific capacity is the calculation used to evaluate the performance of the well. The average specific capacity of the well before cleaning was 4.49 and after the cleaning 5.15. A 13% increase in the wells ability to develop water was realized. The well now has the ability to develop 5.15 gallons per foot of water as opposed to 4.49 gallons.

The cleaning of the well removed the scale and bacteria from the well reducing the chance of coliform and E.coli. The Bacteria found in the well can lead to sulfides that leads to coliform that leads to the harboring E.coli.

The improvement of the system will reduce energy consumption. Wire to water is the calculation used to evaluate the overall efficiency of the pump and motor. The old pump and motor efficiency was performing at 19% efficient. The new system was performing at 51% when performing the test pump. When performing the test pump we could not develop the proper pressure to bring the pump into the most efficient range. When in operation the pump system will reduce the flow and increase the pressure on the pump and more to a higher point on the curve resulting in a higher efficiency. The will move into the best efficiency should move up to about 77%. The increased efficiency in the pump will increase the wire-water efficiency to 62% resulting in a savings of about \$ 5,466 per year.

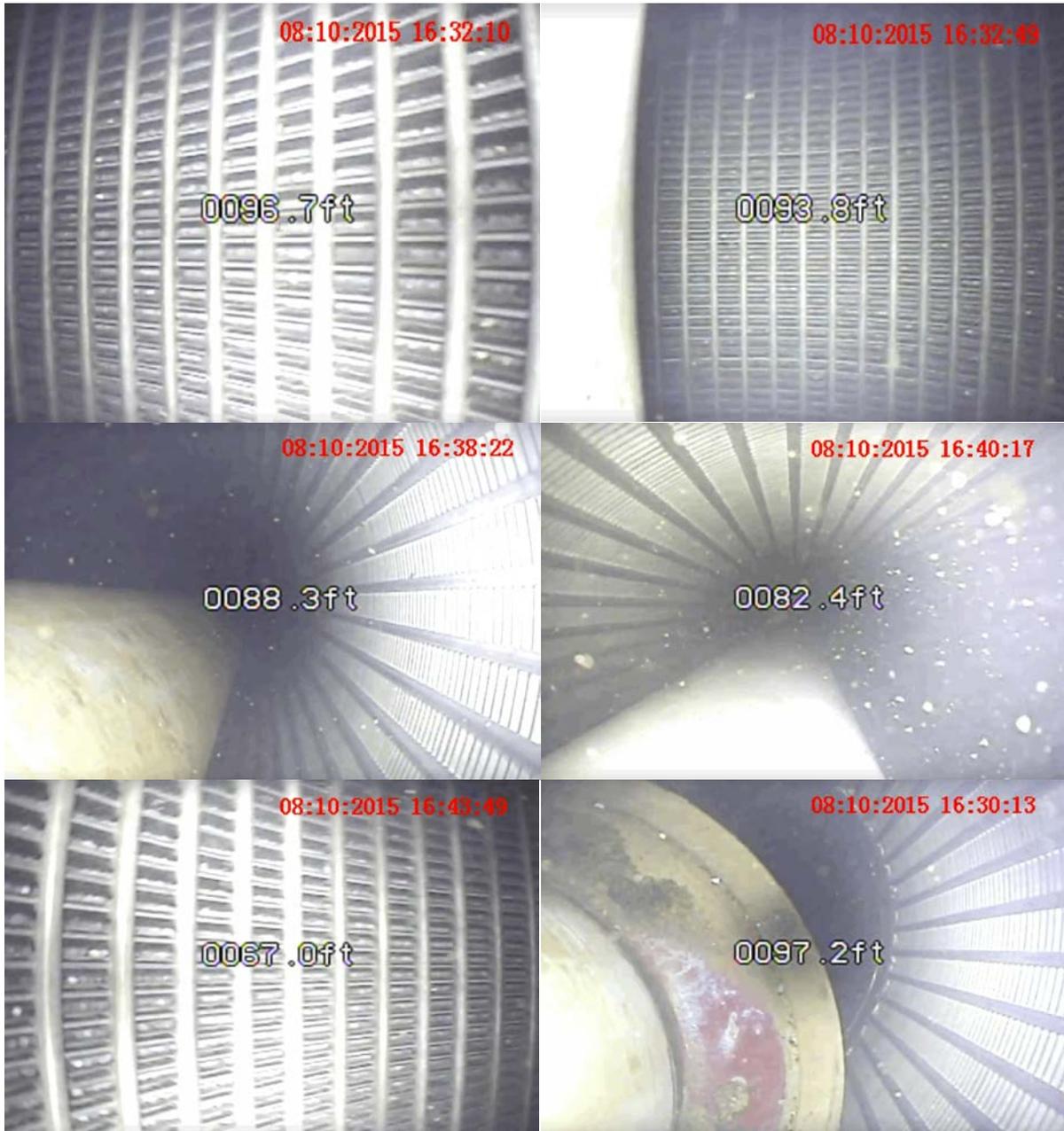
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Pump Efficiency Data:

date:	Test 1	Test 2	Test 3
time:	2:15	3:15	4:15
Pumping water level	60.16	58.5	54.33
Static water level	10	10	10
Draw down	50.16	48.5	44.33
Orifice reading	61	56	48
Gallons per min	259	248	229
Specific Capacity	5.16	5.11	5.17
Pressure:	49	65	93
total head:	173.35	208.65	269.16
Volts [ave]	480	480	480
Amps [ave]	34.3	34.3	34
Kw input	22.79	22.79	22.59
Meter r/s			
Water hp:	11.34	13.07	15.57
Input kw:			
Input hp:	30.54	30.54	30.28
Break horse power	24.44	24.44	24.22
Pump efficiency	46%	53%	64%
Wire-water efficiency	37%	43%	51%

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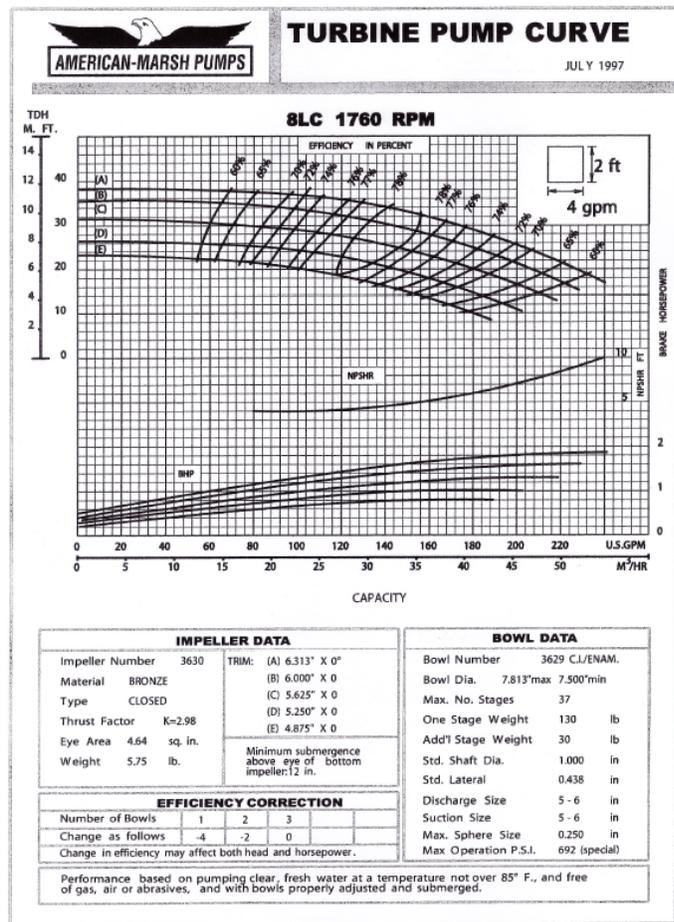
Video Images After Well Rehabilitation:



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Test Pump Estimated Annual Energy Savings	
Wire-water efficiency new	0.51
Wire-water efficiency old	0.19
Delta efficiency	0.32
Operational hr	4000
Kw input	22.7
Cost/Kwhr	\$ 0.14
Annual energy savings	\$ 4,067.84

In Service Estimated Annual Energy Savings	
Wire-water efficiency new	0.62
Wire-water efficiency old	0.19
Delta efficiency	0.43
Operational hr	4000
Kw input	22.7
Cost/Kwhr	\$ 0.14
Annual energy savings	\$ 5,466.16



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